

CLAIMS:

1. A reverse osmosis water supply apparatus comprising:
 - an inlet for connection to a water source;
 - at least one reverse osmosis element including a membrane contained
 - 5 in a membrane housing, the element being arranged to receive water from the inlet and having a permeate outlet connected to a product side of the membrane and a waste outlet connected to a waste side of the membrane;
 - a pressurized permeate storage tank connected to the permeate outlet;
 - a valve operable by a user for tapping water on demand from the
 - 10 permeate storage tank;
 - a pressurized waste storage tank connected to the waste outlet;
 - a flow control device operable to cause flow of water from the source over the membrane for controlling the production from the membrane of the permeate and the waste and operable to halt flow;
 - 15 a toilet tank for supplying flush water to a toilet;
 - a filling valve operable to fill the toilet tank to a required level in response to use of the flush water;
 - a connection from the waste storage tank to the filling valve of the toilet tank for filling the toilet tank with waste from the reverse osmosis element.
2. The apparatus according to claim 1 wherein there is provided a control switch for operating the flow control device, the control switch being responsive to a reduction in pressure within the waste storage tank below a
- 20

predetermined minimum, indicating a requirement for re-filling the waste storage tank, to operate the flow control device to cause said flow.

3. The apparatus according to claim 2 wherein the control switch, the reverse osmosis element and the flow control device are arranged such that, when the permeate storage tank is filled to less than capacity, the permeate is supplied to and stored in the permeate storage tank and, when the permeate supply tank is filled to capacity, no permeate passes through the membrane and all water received from the inlet is supplied to waste.

4. The apparatus according to claim 1 wherein the flow control device comprises a pump having a suction side connected to the waste outlet of the reverse osmosis element and a pressure outlet connected to the pressurized waste storage tank and arranged to draw water away from the waste side of the membrane at a rate sufficient to ensure adequate flow on the waste side of the membrane to avoid an increase in contamination of the permeate.

5. The apparatus according to claim 4 wherein the pump is arranged such that the rate of flow on the waste side is substantially independent of the pressure in the waste storage tank.

6. The apparatus according to claim 4 wherein there is provided a flow restrictor between the inlet of the pump and the waste outlet of the element so as to provide a back pressure against the waste side of the membrane.

7. The apparatus according to claim 1 wherein there is provided a bypass duct connected from the inlet directly to the outlet of the waste storage tank

for supplying water from the source to the outlet of the waste storage tank, the bypass duct including a pressure regulator valve arranged to operate to allow passage of water from the source to the outlet of the waste storage tank only in the event that the pressure at the outlet of the waste storage tank drops below a
5 predetermined minimum pressure.

8. The apparatus according to claim 7 wherein there is provided a back check valve between the duct and the outlet of the waste storage tank to prevent filling of the waste storage tank from the source.

9. The apparatus according to claim 1 wherein the at least one
10 reverse osmosis element comprises a first and a second reverse osmosis element each including a membrane contained in a membrane housing, the element being arranged to receive water from the inlet and having a permeate outlet connected to a product side of the membrane and a waste outlet connected to a waste side of the membrane and wherein the permeate from the product side of the first is supplied as
15 input to the second.

10. A reverse osmosis water supply apparatus comprising:
an inlet for connection to a water source;
at least one reverse osmosis element including a membrane contained
in a membrane housing, the element being arranged to receive water from the inlet
20 and having a permeate outlet connected to a product side of the membrane and a waste outlet connected to a waste side of the membrane;
a pressurized permeate storage tank;

a valve operable by a user for tapping water on demand from the permeate storage tank;

a pressurized waste storage tank;

an outlet for connection from the waste storage tank to an end use
5 location for use of the waste from the reverse osmosis element;

a flow control device operable to cause flow of water from the source over the membrane for controlling the production from the membrane of the permeate and the waste and operable to halt flow;

and a control switch for operating the flow control device;

10 the control switch being responsive to a reduction in pressure within the waste storage tank below a predetermined minimum, indicating a requirement for re-filling the waste storage tank, to operate the flow control device to cause said flow;

the control switch, the reverse osmosis element and the flow control
15 device being arranged such that, when the permeate storage tank is filled to less than capacity, the permeate is supplied to and stored in the permeate storage tank and, when the permeate supply tank is filled to capacity, no permeate passes through the membrane and all water received from the inlet is supplied to waste.

11. The apparatus according to claim 10 wherein the flow control
20 device comprises a pump having a suction side connected to the waste outlet of the reverse osmosis element and a pressure outlet connected to the pressurized waste storage tank and arranged to draw water away from the waste side of the

membrane at a rate sufficient to ensure adequate flow on the waste side of the membrane to avoid an increase in contamination of the permeate.

12. The apparatus according to claim 11 wherein the pump is arranged such that the rate of flow on the waste side is substantially independent of the pressure in the waste storage tank.

13. The apparatus according to claim 11 wherein there is provided a flow restrictor between the inlet of the pump and the waste outlet of the element so as to provide a back pressure against the waste side of the membrane.

14. The apparatus according to claim 10 wherein the at least one reverse osmosis element comprises a first and a second reverse osmosis element each including a membrane contained in a membrane housing, the element being arranged to receive water from the inlet and having a permeate outlet connected to a product side of the membrane and a waste outlet connected to a waste side of the membrane and wherein the permeate from the product side of the first is supplied as input to the second.

15. A reverse osmosis water supply apparatus comprising:
an inlet for connection to a water source;
at least one reverse osmosis element including a membrane contained in a membrane housing, the element being arranged to receive water from the inlet and having a permeate outlet connected to a product side of the membrane and a waste outlet connected to a waste side of the membrane;
a pressurized permeate storage tank;

a valve operable by a user for tapping water on demand from the permeate storage tank;

a pressurized waste storage tank;

an outlet for connection from the waste storage tank to an end use
5 location for use of the waste from the reverse osmosis element;

and a pump having a suction side connected to the waste outlet of the reverse osmosis element and a pressure outlet connected to the pressurized waste storage tank and arranged to draw water is away from the waste side of the membrane at a rate sufficient to ensure adequate flow on the waste side of the
10 membrane to avoid an increase in contamination of the permeate.

16. The apparatus according to claim 15 wherein the pump is arranged such that the rate of flow on the waste side of the membrane is substantially independent of the pressure in the waste storage tank.

17. The apparatus according to claim 15 wherein there is provided a
15 flow restrictor between the inlet of the pump and the waste outlet of the element so as to provide a back pressure against the waste side of the membrane

18. The apparatus according to claim 15 wherein the at least one reverse osmosis element comprises a first and a second reverse osmosis element each including a membrane contained in a membrane housing, the element being
20 arranged to receive water from the inlet and having a permeate outlet connected to a product side of the membrane and a waste outlet connected to a waste side of the

membrane and wherein the permeate from the product side of the first is supplied as input to the second.

19. A reverse osmosis water supply apparatus comprising:

an inlet for connection to a water source;

5 at least one reverse osmosis element including a membrane contained in a membrane housing, the element being arranged to receive water from the inlet and having a permeate outlet connected to a product side of the membrane and a waste outlet connected to a waste side of the membrane;

a pressurized permeate storage tank;

10 a valve operable by a user for tapping water on demand from the permeate storage tank;

a pressurized waste storage tank;

an outlet for connection from the waste storage tank to an end use location for use of the waste from the reverse osmosis element;

15 a flow control device operable to cause flow of water from the source over the membrane for controlling the production from the membrane of the permeate and the waste and operable to halt flow;

and a bypass duct connected from the inlet directly to the outlet of the waste storage tank for supplying water from the source to the outlet of the waste
20 storage tank, the bypass duct including a pressure regulator valve arranged to operate to allow passage of water from the source to the outlet of the waste storage

tank only in the event that the pressure at the outlet of the waste storage tank drops below a predetermined minimum pressure.

20. The apparatus according to claim 19 wherein there is provided a back check valve between the duct and the outlet of the waste storage tank to prevent filling of the waste storage tank from the source.

21. The apparatus according to claim 19 wherein the at least one reverse osmosis element comprises a first and a second reverse osmosis element each including a membrane contained in a membrane housing, the element being arranged to receive water from the inlet and having a permeate outlet connected to a product side of the membrane and a waste outlet connected to a waste side of the membrane and wherein the permeate from the product side of the first is supplied as input to the second.